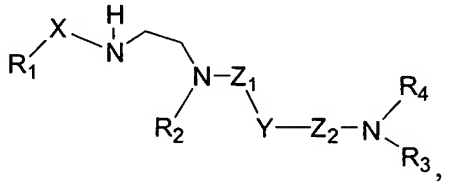
WHAT IS CLAIMED IS:

1. A method for treating an inflammatory or immune disease, a developmental or degenerative disease, or a tissue injury, comprising administering to a subject in need thereof an effective amount of a compound of the formula:



wherein

X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-C(O)-$, $-SO_2-$, or deleted;

Y is aryl, heteroaryl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, C_5-C_8 heterocycloalkenyl, or deleted;

each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH=CH-$, $-CH=N-$, $-CH=N-NR-$, $-S-$, $-O-$, $-NR-$, $-C(O)-$, or $-SO_2-$;

R_1 is H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl; C_5-C_8 heterocycloalkenyl, aryl, or heteroaryl;

R_2 is $-A_1-B_1-D_1-E_1$;

R_3 is $-A_2-B_2-D_2-E_2$, deleted, or, together with R_4, is C_4-C_{20} cycloalkyl, C_4-C_{20} cycloalkenyl, C_4-C_{20} heterocycloalkyl, or C_4-C_{20} heterocycloalkenyl; provided that if R_3 is deleted, $-Z_2-N-$ is $-CH=N-$; and

R_4 is $-A_3-B_3-D_3-E_3$ or, together with R_3, is C_4-C_{20} cycloalkyl, C_4-C_{20} cycloalkenyl, C_4-C_{20} heterocycloalkyl, or C_4-C_{20} heterocycloalkenyl;

in which each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-C_4H_8-$, $-C_5H_{10}-$, $-CH_2C(O)-$, $-C(O)CH_2-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, $-CH(COOR)-$, $-CH(CH_2COOR)-$, $-CH(C(O)NR_2)-$, or deleted; each of B_1, B_2, and B_3, independently, is $-NR-$, $-CH_2-$, or deleted; each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-C(O)-$, $-SO_2-$, $-C(O)-NR-$, $-C(S)-NR-$, $-NR-C(O)-$, $-NR-C(S)-$, $-CH(OR)-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, $-CH(COOR)-$, 1,1-cyclopropylene, or deleted; and each of E_1, E_2, and E_3, independently, is H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8

cycloalkenyl, C_3-C_8 heterocycloalkyl, C_5-C_8 heterocycloalkenyl, aryl, or heteroaryl; each R, independently, being H or C_1-C_{10} alkyl.

2. The method of claim 1, wherein X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-SO_2-$, or deleted; Y is aryl, heteroaryl, C_5-C_8 cycloalkenyl, or deleted; each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, -CH=CH-, -CH=N-NR-, -NR-, -C(O)-, or $-SO_2-$; R_1 is C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; R_3 is $-A_2-B_2-D_2-E_2$, deleted, or, together with R_4, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; R_4 is $-A_3-B_3-D_3-E_3$ or, together with R_3, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, or $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, -CH(COOR)-, $-CH(CH_2COOR)-$, deleted; each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, -C(O)-, $-SO_2-$, -CH(OR)-, -CH(COOR)-, 1,1-cyclopropylene, or deleted; and each of E_1, E_2, and E_3, independently, is H, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl.

3. The method of claim 2, wherein X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-SO_2-$, or deleted; Y is aryl, heteroaryl, or deleted; each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, -CH=CH-, or $-SO_2-$; R_1 is C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, -CH(COOR)-, $-CH(CH_2COOR)-$, or deleted; each of B_1, B_2, and B_3, independently, is -NH- or deleted; and each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, -C(O)-, $-SO_2-$, -CH(OR)-, -CH(COOR)-, 1,1-cyclopropylene, or deleted.

4. The method of claim 3, wherein X is $-CH_2-$ or $-CH(CH_3)-$, Y is deleted, Z_1 is $-CH_2-$, and Z_2 is $-CH_2-$.

5. The method of claim 3, wherein X is $-CH_2-$ or $-CH(CH_3)-$, Y is phenyl, Z_1 is $-CH_2-$ or $-SO_2-$, and Z_2 is $-CH_2-$ or $-SO_2-$.

6. The method of claim 3, wherein X is $-CH_2-$, Y is 4,4'-biphenyl, Z_1 is $-CH_2-$, and Z_2 is $-CH_2-$.

7. The method of claim 3, wherein X is $-CH_2-$, Y is phenyl, and R_3 is deleted.

8. The method of claim 4, wherein R_3 is $-A_2-B_2-D_2-E_2$; R_4 is $-A_3-B_3-D_3-E_3$; A_1 is $-C_2H_4-$ or deleted; A_2 is deleted; A_3 is deleted; B_2 is deleted; B_3 is deleted; D_1 is $-CH_2-$; D_2 is deleted; D_3 is $-CH_2-$; E_1 is aryl or heteroaryl; E_2 is H; and E_3 is aryl or heteroaryl.

9. The method of claim 5, wherein R_3 is $-A_2-B_2-D_2-E_2$ or, together with R_4, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; A_1 is $-C_2H_4-$ or $-CH(CH_3)CH_2-$; A_2 is $-C_2H_4-$ or deleted; A_3 is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH(CH_2OH)-$, $-CH(COOH)-$, $-CH(CH_2OCH_3)-$, $-CH(CH_2CH_2OH)-$, $-CH(CH_2COOH)-$, or deleted; B_1 is $-NH-$, $-N(CH_2CH_2OH)-$, or $-N(CH_2CH_3)-$; D_1 is $-CH_2-$, $-CH(CH_3)-$, $-CH(CH_2OH)-$, $-CH(CH_2CH_2OH)-$, or deleted; D_2 is $-CH_2-$ or deleted; D_3 is $-CH_2-$, $-CH(OH)-$, $-CH(COOH)-$, 1,1-cyclopropylene, or deleted; E_1 is H, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; E_2 is H, aryl, or heteroaryl; and E_3 is aryl, heteroaryl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, or C_3-C_8 heterocycloalkyl.

10. The method of claim 6, wherein R_3 is $-A_2-B_2-D_2-E_2$; R_4 is $-A_3-B_3-D_3-E_3$; A_1 is $-C_2H_4-$; A_2 is deleted; A_3 is $-CH(CH_2OH)-$; B_1 is $-NH-$; B_2 is deleted; B_3 is deleted; D_1 is $-CH_2-$; D_2 is $-CH_2-$ or deleted; D_3 is $-CH_2-$; E_1 is heteroaryl; E_2 is H or heteroaryl; and E_3 is aryl.

11. The method of claim 7, wherein R_1 is heteroaryl; R_4 is $-A_3-B_3-D_3-E_3$; A_1 is $-C_2H_4-$; A_3 is deleted; B_1 is $-NH-$; B_3 is $-NH-$; D_1 is $-CH_2-$; D_3 is $-C(O)-$; E_1 is heteroaryl; and E_3 is heteroaryl.

12. The method of claim 1, wherein the inflammatory or immune disease is asthma, allergic rhinitis, hypersensitivity lung disease, autoimmune disease, graft rejection, human immunodeficiency virus infection, or cancer.

13. The method of claim 12, wherein the cancer is brain, breast, prostate, colon, kidney, ovary, thyroid, lung, or haematopoietic cancer.

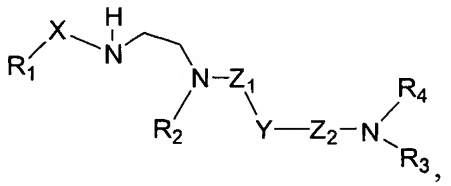
14. The method of claim 12, wherein the hypersensitivity lung disease is idiopathic pulmonary fibrosis.

15. The method of claim 12, wherein the autoimmune disease is rheumatoid arthritis, systemic lupus erythematosus, ankylosing spondylitis, or systemic sclerosis.

16. The method of claim 1, wherein the developmental or degenerative disease is spinal muscular atrophy, Duchenne muscular dystrophy, Parkinson's disease, or Alzheimer's disease.

17. The method of claim 1, wherein the tissue injury is brain injury, heart injury, liver damage, skeletal muscle injury, kidney damage, pancreatic injury, lung injury, skin injury, or gastrointestinal tract injury.

18. A method for enhancing migration of bone marrow-derived cells to blood, comprising administering to a subject in need thereof an effective amount of a compound of the formula:



wherein

X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-C(O)-$, $-SO_2-$, or deleted;

Y is aryl, heteroaryl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, C_5-C_8 heterocycloalkenyl, or deleted;

each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH=CH-$, $-CH=N-$, $-CH=N-NR-$, $-S-$, $-O-$, $-NR-$, $-C(O)-$, or $-SO_2-$;

R_1 is H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl; C_5-C_8 heterocycloalkenyl, aryl, or heteroaryl;

R_2 is -A_1-B_1-D_1-E_1;

R_3 is -A_2-B_2-D_2-E_2, deleted, or, together with R_4, is C_4-C_{20} cycloalkyl, C_4-C_{20} cycloalkenyl, C_4-C_{20} heterocycloalkyl, or C_4-C_{20} heterocycloalkenyl; provided that if R_3 is deleted, -Z_2-N- is -CH=N-; and

R_4 is -A_3-B_3-D_3-E_3 or, together with R_3, is C_4-C_{20} cycloalkyl, C_4-C_{20} cycloalkenyl, C_4-C_{20} heterocycloalkyl, or C_4-C_{20} heterocycloalkenyl;

in which each of A_1, A_2, and A_3, independently, is -CH_2-, -C_2H_4-, -C_3H_6-, -C_4H_8-, -C_5H_{10}-, -$CH_2C(O)$-, -$C(O)CH_2$-, -CH_2SO_2-, -SO_2CH_2-, -CH_2-CH=CH-, -CH=CH-CH_2-, -$CH(CH_2OR)$-, -$CH(CH_2CH_2OR)$-, -CH(COOR)-, -$CH(CH_2COOR)$-, -$CH(C(O)NR_2)$-, or deleted; each of B_1, B_2, and B_3, independently, is -NR-, -CH_2-, or deleted; each of D_1, D_2, and D_3, independently, is -CH_2-, -C_2H_4-, -C_3H_6-, -CH_2-CH=CH-, -CH=CH-CH_2-, -C(O)-, -SO_2-, -C(O)-NR-, -C(S)-NR-, -NR-C(O)-, -NR-C(S)-, -CH(OR)-, -$CH(CH_2OR)$-, -$CH(CH_2CH_2OR)$-, -CH(COOR)-, 1,1-cyclopropylene, or deleted; and each of E_1, E_2, and E_3, independently, is H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, C_5-C_8 heterocycloalkenyl, aryl, or heteroaryl; each R, independently, being H or C_1-C_{10} alkyl.

19. The method of claim 18, wherein X is -CH_2-, -C_2H_4-, -C_3H_6-, -CH_2-CH=CH-, -CH=CH-CH_2-, -SO_2-, or deleted; Y is aryl, heteroaryl, C_5-C_8 cycloalkenyl, or deleted; each of Z_1 and Z_2, independently, is -CH_2-, -C_2H_4-, -C_3H_6-, -CH=CH-, -CH=N-NR-, -NR-, -C(O)-, or -SO_2-; R_1 is C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; R_3 is -A_2-B_2-D_2-E_2, deleted, or, together with R_4, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; R_4 is -A_3-B_3-D_3-E_3 or, together with R_3, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; each of A_1, A_2, and A_3, independently, is -CH_2-, -C_2H_4-, -C_3H_6-, -CH_2SO_2-, -SO_2CH_2-, -CH_2-CH=CH-, -CH=CH-CH_2-, or -$CH(CH_2OR)$-, -$CH(CH_2CH_2OR)$-, -CH(COOR)-, -$CH(CH_2COOR)$-, deleted; each of D_1, D_2, and D_3, independently, is -CH_2-, -C_2H_4-, -C_3H_6-, -CH_2-CH=CH-, -CH=CH-CH_2-, -C(O)-, -SO_2-, -CH(OR)-, -CH(COOR)-, 1,1-cyclopropylene, or deleted; and each of E_1, E_2,

and E_3, independently, is H, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl.

20. The method of claim 19, wherein X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-SO_2-$, or deleted; Y is aryl, heteroaryl, or deleted; each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, -CH=CH-, or $-SO_2-$; R_1 is C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, -CH(COOR)-, $-CH(CH_2COOR)-$, or deleted; each of B_1, B_2, and B_3, independently, is -NH- or deleted; and each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, -C(O)-, $-SO_2-$, -CH(OR)-, -CH(COOR)-, 1,1-cyclopropylene, or deleted.

21. The method of claim 20, wherein X is $-CH_2-$ or $-CH(CH_3)-$, Y is deleted, Z_1 is $-CH_2-$, and Z_2 is $-CH_2-$.

22. The method of claim 20, wherein X is $-CH_2-$ or $-CH(CH_3)-$, Y is phenyl, Z_1 is $-CH_2-$ or $-SO_2-$, and Z_2 is $-CH_2-$ or $-SO_2-$.

23. The method of claim 20, wherein X is $-CH_2-$, Y is 4,4'-biphenyl, Z_1 is $-CH_2-$, and Z_2 is $-CH_2-$.

24. The method of claim 20, wherein X is $-CH_2-$, Y is phenyl, and R_3 is deleted.

25. The method of claim 21, wherein R_3 is $-A_2-B_2-D_2-E_2$; R_4 is $-A_3-B_3-D_3-E_3$; A_1 is $-C_2H_4-$ or deleted; A_2 is deleted; A_3 is deleted; B_2 is deleted; B_3 is deleted; D_1 is $-CH_2-$; D_2 is deleted; D_3 is $-CH_2-$; E_1 is aryl or heteroaryl; E_2 is H; and E_3 is aryl or heteroaryl.

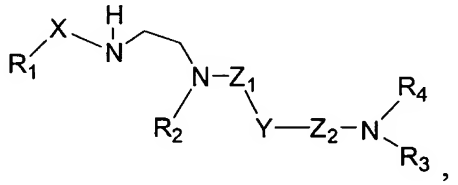
26. The method of claim 22, wherein R_3 is $-A_2-B_2-D_2-E_2$ or, together with R_4, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; A_1 is $-C_2H_4-$ or $-CH(CH_3)CH_2-$; A_2 is $-C_2H_4-$ or deleted; A_3 is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH(CH_2OH)-$, -CH(COOH)-, $-CH(CH_2OCH_3)-$, $-CH(CH_2CH_2OH)-$, $-CH(CH_2COOH)-$, or deleted; B_1 is -NH-, $-N(CH_2CH_2OH)-$, or $-N(CH_2CH_3)-$; D_1 is $-CH_2-$, $-CH(CH_3)-$, $-CH(CH_2OH)-$,

-CH(CH_2CH_2OH)-, or deleted; D_2 is -CH_2- or deleted; D_3 is -CH_2-, -CH(OH)-, -CH(COOH)-, 1,1-cyclopropylene, or deleted; E_1 is H, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; E_2 is H, aryl, or heteroaryl; and E_3 is aryl, heteroaryl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, or C_3-C_8 heterocycloalkyl.

27. The method of claim 23, wherein R_3 is -A_2-B_2-D_2-E_2; R_4 is -A_3-B_3-D_3-E_3; A_1 is -C_2H_4-; A_2 is deleted; A_3 is -CH(CH_2OH)-; B_1 is -NH-; B_2 is deleted; B_3 is deleted; D_1 is -CH_2-; D_2 is -CH_2- or deleted; D_3 is -CH_2-; E_1 is heteroaryl; E_2 is H or heteroaryl; and E_3 is aryl.

28. The method of claim 24, wherein R_1 is heteroaryl; R_4 is -A_3-B_3-D_3-E_3; A_1 is -C_2H_4-; A_3 is deleted; B_1 is -NH-; B_3 is -NH-; D_1 is -CH_2-; D_3 is -C(O)-; E_1 is heteroaryl; and E_3 is heteroaryl.

29. A compound of the formula:



wherein

X is -CH_2-, -C_2H_4-, -C_3H_6-, -CH_2-CH=CH-, -CH=CH-CH_2-, -C(O)-, -SO_2-, or deleted;

Y is aryl, heteroaryl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, or C_5-C_8 heterocycloalkenyl;

each of Z_1 and Z_2, independently, is -CH_2-, -C_2H_4-, -C_3H_6-, -CH=CH-, -CH=N-, -CH=N-NR-, -S-, -O-, -NR-, -C(O)-, or -SO_2-;

R_1 is H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl; C_5-C_8 heterocycloalkenyl, aryl, or heteroaryl;

R_2 is -A_1-B_1-D_1-E_1;

R_3 is -A_2-B_2-D_2-E_2, deleted, or, together with R_4, is C_4-C_{20} cycloalkyl, C_4-C_{20} cycloalkenyl, C_4-C_{20} heterocycloalkyl, or C_4-C_{20} heterocycloalkenyl; provided that if R_3 is deleted, -Z_2-N- is -CH=N-; and

R_4 is $-A_3-B_3-D_3-E_3$ or, together with R_3, is C_4-C_{20} cycloalkyl, C_4-C_{20} cycloalkenyl, C_4-C_{20} heterocycloalkyl, or C_4-C_{20} heterocycloalkenyl;
in which each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-C_4H_8-$, $-C_5H_{10}-$, $-CH_2C(O)-$, $-C(O)CH_2-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, $-CH(COOR)-$, $-CH(CH_2COOR)-$, $-CH(C(O)NR_2)-$, or deleted; each of B_1, B_2, and B_3, independently, is $-NR-$, $-CH_2-$, or deleted; each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-C(O)-$, $-SO_2-$, $-C(O)-NR-$, $-C(S)-NR-$, $-NR-C(O)-$, $-NR-C(S)-$, $-CH(OR)-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, $-CH(COOR)-$, 1,1-cyclopropylene, or deleted; and each of E_1, E_2, and E_3, independently, is H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, C_5-C_8 heterocycloalkenyl, aryl, or heteroaryl; each R, independently, being H or C_1-C_{10} alkyl.

30. The compound of claim 29, wherein X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-SO_2-$, or deleted; Y is aryl, heteroaryl, C_5-C_8 cycloalkenyl; each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH=CH-$, $-CH=N-NR-$, $-NR-$, $-C(O)-$, or $-SO_2-$; R_1 is C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; R_3 is $-A_2-B_2-D_2-E_2$, deleted, or, together with R_4, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; R_4 is $-A_3-B_3-D_3-E_3$ or, together with R_3, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, or $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, $-CH(COOR)-$, $-CH(CH_2COOR)-$, deleted; each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-C(O)-$, $-SO_2-$, $-CH(OR)-$, $-CH(COOR)-$, 1,1-cyclopropylene, or deleted; and each of E_1, E_2, and E_3, independently, is H, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl.

31. The compound of claim 30, wherein X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-SO_2-$, or deleted; Y is aryl or heteroaryl; each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH=CH-$, or $-SO_2-$; R_1 is C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH(CH_2OR)-$,

-CH(CH_2CH_2OR)-, -CH(COOR)-, -CH(CH_2COOR)-, or deleted; each of B_1, B_2, and B_3, independently, is -NH- or deleted; and each of D_1, D_2, and D_3, independently, is -CH_2-, -C_2H_4-, -C_3H_6-, -C(O)-, -SO_2-, -CH(OR)-, -CH(COOR)-, 1,1-cyclopropylene, or deleted.

32. The compound of claim 31, wherein X is -CH_2- or -$CH(CH_3)$-, Y is phenyl, Z_1 is -CH_2- or -SO_2-, and Z_2 is -CH_2- or -SO_2-.

33. The compound of claim 31, wherein X is -CH_2-, Y is 4,4'-biphenyl, Z_1 is -CH_2-, and Z_2 is -CH_2-.

34. The compound of claim 31, wherein X is -CH_2-, Y is phenyl, and R_3 is deleted.

35. The compound of claim 32, wherein R_3 is -A_2-B_2-D_2-E_2 or, together with R_4, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; A_1 is -C_2H_4- or -$CH(CH_3)CH_2$-; A_2 is -C_2H_4- or deleted; A_3 is -CH_2-, -C_2H_4-, -C_3H_6-, -$CH(CH_2OH)$-, -CH(COOH)-, -$CH(CH_2OCH_3)$-, -$CH(CH_2CH_2OH)$-, -$CH(CH_2COOH)$-, or deleted; B_1 is -NH-, -$N(CH_2CH_2OH)$-, or -$N(CH_2CH_3)$-; D_1 is -CH_2-, -$CH(CH_3)$-, -$CH(CH_2OH)$-, -$CH(CH_2CH_2OH)$-, or deleted; D_2 is -CH_2- or deleted; D_3 is -CH_2-, -CH(OH)-, -CH(COOH)-, 1,1-cyclopropylene, or deleted; E_1 is H, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; E_2 is H, aryl, or heteroaryl; and E_3 is aryl, heteroaryl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, or C_3-C_8 heterocycloalkyl.

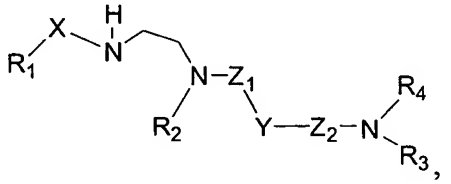
36. The compound of claim 35, wherein the compound is one of compounds 60-78, 80-84, 86-109, and 111-126.

37. The compound of claim 33, wherein R_3 is -A_2-B_2-D_2-E_2; R_4 is -A_3-B_3-D_3-E_3; A_1 is -C_2H_4-; A_2 is deleted; A_3 is -$CH(CH_2OH)$-; B_1 is -NH-; B_2 is deleted; B_3 is deleted; D_1 is -CH_2-; D_2 is -CH_2- or deleted; D_3 is -CH_2-; E_1 is heteroaryl; E_2 is H or heteroaryl; and E_3 is aryl.

38. The compound of claim 37, wherein the compound is compound 79 or 85.

39. The compound of claim 34, wherein R_1 is heteroaryl; R_4 is $-A_3-B_3-D_3-E_3$; A_1 is $-C_2H_4-$; A_3 is deleted; B_1 is -NH-; B_3 is -NH-; D_1 is $-CH_2-$; D_3 is -C(O)-; E_1 is heteroaryl; and E_3 is heteroaryl.

40. A compound of the formula:



wherein

X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-SO_2-$, or deleted;

Y is aryl, heteroaryl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, C_5-C_8 heterocycloalkenyl, or deleted;

each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, -CH=CH-, -CH=N-, -CH=N-NR-, -S-, -O-, -NR-, -C(O)-, or $-SO_2-$;

R_1 is H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl; C_5-C_8 heterocycloalkenyl, aryl, or heteroaryl;

R_2 is $-A_1-B_1-D_1-E_1$;

R_3 is $-A_2-B_2-D_2-E_2$, deleted, or, together with R_4, is C_4-C_{20} cycloalkyl, C_4-C_{20} cycloalkenyl, C_4-C_{20} heterocycloalkyl, or C_4-C_{20} heterocycloalkenyl; provided that if R_3 is deleted, $-Z_2-N-$ is -CH=N-; and

R_4 is $-A_3-B_3-D_3-E_3$ or, together with R_3, is C_4-C_{20} cycloalkyl, C_4-C_{20} cycloalkenyl, C_4-C_{20} heterocycloalkyl, or C_4-C_{20} heterocycloalkenyl;

in which each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-C_4H_8-$, $-C_5H_{10}-$, $-CH_2C(O)-$, $-C(O)CH_2-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, $-CH(COOR)-$, $-CH(CH_2COOR)-$, $-CH(C(O)NR_2)-$, or deleted; each of B_1, B_2, and B_3, independently, is -NR-, $-CH_2-$, or deleted; each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-SO_2-$, -C(O)-NR-, -C(S)-NR-, -NR-C(O)-, -NR-C(S)-, -CH(OR)-, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, -CH(COOR)-, 1,1-cyclopropylene, or deleted; E_1 is H, C_1-C_{10} alkyl, C_2-

C_{10} alkenyl, C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, C_5-C_8 heterocycloalkenyl, aryl, 5-membered heteroaryl, fused heteroaryl, substituted 6-membered heteroaryl, unsubstituted pryanyl, unsubstituted pyrazinyl, unsubstituted pyrimidinyl, or unsubstituted pyridazinyl; and each of E_2 and E_3, independently, is H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, C_5-C_8 heterocycloalkenyl, aryl, or heteroaryl; each R, independently, being H or C_1-C_{10} alkyl.

41. The compound of claim 40, wherein X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-SO_2-$, or deleted; Y is aryl, heteroaryl, C_5-C_8 cycloalkenyl, or deleted; each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH=CH-$, $-CH=N-NR-$, $-NR-$, $-C(O)-$, or $-SO_2-$; R_1 is C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; R_3 is $-A_2-B_2-D_2-E_2$, deleted, or, together with R_4, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; R_4 is $-A_3-B_3-D_3-E_3$ or, together with R_3, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, $-CH(COOR)-$, $-CH(CH_2COOR)-$, or deleted; each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-C(O)-$, $-SO_2-$, $-CH(OR)-$, $-CH(COOR)-$, 1,1-cyclopropylene, or deleted; E_1 is H, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, aryl, 5-membered heteroaryl, fused heteroaryl, or substituted 6-membered heteroaryl; and each of E_2 and E_3, independently, is H, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl.

42. The compound of claim 41, wherein X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-SO_2-$, or deleted; Y is aryl, heteroaryl, or deleted; each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH=CH-$, or $-SO_2-$; R_1 is C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, $-CH(COOR)-$, $-CH(CH_2COOR)-$, or deleted; each of B_1, B_2, and B_3, independently, is -NH- or deleted; each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-C(O)-$, $-SO_2-$, $-CH(OR)-$, $-CH(COOR)-$, 1,1-cyclopropylene, or deleted; E_1 is H,

aryl, 5-membered heteroaryl, or fused heteroaryl; and each of E_2 and E_3, independently, is H, aryl, or heteroaryl.

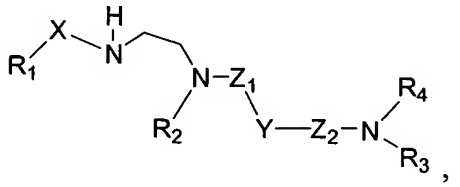
43. The compound of claim 42, wherein X is $-CH_2-$ or $-CH(CH_3)-$, Y is deleted, Z_1 is $-CH_2-$, and Z_2 is $-CH_2-$.

44. The compound of claim 43, wherein R_1 is aryl; R_3 is $-A_2-B_2-D_2-E_2$; R_4 is $-A_3-B_3-D_3-E_3$; A_1 is $-C_2H_4-$; A_2 is deleted; A_3 is deleted; B_1 is -NH-; B_2 is deleted; B_3 is deleted; D_1 is $-CH_2-$; D_2 is deleted; D_3 is $-CH_2-$; E_1 is aryl; E_2 is H; and E_3 is aryl.

45. The compound of claim 43, wherein R_1 is heteroaryl; R_3 is $-A_2-B_2-D_2-E_2$; R_4 is $-A_3-B_3-D_3-E_3$; A_1 is $-C_2H_4-$ or deleted; A_2 is deleted; A_3 is deleted; B_2 is deleted; B_3 is deleted; D_1 is $-CH_2-$; D_2 is deleted; D_3 is $-CH_2-$; E_1 is aryl, 5-membered heteroaryl, or fused heteroaryl; E_2 is H; and E_3 is heteroaryl.

46. The compound of claim 45, wherein the compound is compound 110.

47. A pharmaceutical composition comprising a compound of the formula:



wherein

X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-C(O)-$, $-SO_2-$, or deleted;

Y is aryl, heteroaryl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, C_5-C_8 heterocycloalkenyl, or deleted;

each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, -CH=CH-, -CH=N-, -CH=N-NR-, -S-, -O-, -NR-, $-C(O)-$, or $-SO_2-$;

R_1 is H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl; C_5-C_8 heterocycloalkenyl, aryl, or heteroaryl;

R_2 is $-A_1-B_1-D_1-E_1$;

R_3 is $-A_2-B_2-D_2-E_2$, deleted, or, together with R_4, is C_4-C_{20} cycloalkyl, C_4-C_{20} cycloalkenyl, C_4-C_{20} heterocycloalkyl, or C_4-C_{20} heterocycloalkenyl; provided that if R_3 is deleted, $-Z_2-N-$ is $-CH=N-$; and

R_4 is $-A_3-B_3-D_3-E_3$ or, together with R_3, is C_4-C_{20} cycloalkyl, C_4-C_{20} cycloalkenyl, C_4-C_{20} heterocycloalkyl, or C_4-C_{20} heterocycloalkenyl;

in which each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-C_4H_8-$, $-C_5H_{10}-$, $-CH_2C(O)-$, $-C(O)CH_2-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, $-CH(COOR)-$, $-CH(CH_2COOR)-$, $-CH(C(O)NR_2)-$, or deleted; each of B_1, B_2, and B_3, independently, is $-NR-$, $-CH_2-$, or deleted; each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-C(O)-$, $-SO_2-$, $-C(O)-NR-$, $-C(S)-NR-$, $-NR-C(O)-$, $-NR-C(S)-$, $-CH(OR)-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, $-CH(COOR)-$, 1,1-cyclopropylene, or deleted; and each of E_1, E_2, and E_3, independently, is H, C_1-C_{10} alkyl, C_2-C_{10} alkenyl, C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, C_5-C_8 heterocycloalkenyl, aryl, or heteroaryl; each R, independently, being H or C_1-C_{10} alkyl; and

a pharmaceutically acceptable carrier.

48. The composition of claim 47, wherein X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-SO_2-$, or deleted; Y is aryl, heteroaryl, C_5-C_8 cycloalkenyl, or deleted; each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH=CH-$, $-CH=N-NR-$, $-NR-$, $-C(O)-$, or $-SO_2-$; R_1 is C_2-C_{10} alkynyl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; R_3 is $-A_2-B_2-D_2-E_2$, deleted, or, together with R_4, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; R_4 is $-A_3-B_3-D_3-E_3$ or, together with R_3, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, or $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, $-CH(COOR)-$, $-CH(CH_2COOR)-$, deleted; each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2-CH=CH-$, $-CH=CH-CH_2-$, $-C(O)-$, $-SO_2-$, $-CH(OR)-$, $-CH(COOR)-$, 1,1-cyclopropylene, or deleted; and each of E_1, E_2, and E_3, independently, is H, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, C_3-C_8 heterocycloalkyl, aryl, or heteroaryl.

49. The composition of claim 48, wherein X is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-SO_2-$, or deleted; Y is aryl, heteroaryl, or deleted; each of Z_1 and Z_2, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, -CH=CH-, or $-SO_2-$; R_1 is C_3-C_8 heterocycloalkyl, aryl, or heteroaryl; each of A_1, A_2, and A_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH_2SO_2-$, $-SO_2CH_2-$, $-CH(CH_2OR)-$, $-CH(CH_2CH_2OR)-$, -CH(COOR)-, $-CH(CH_2COOR)-$, or deleted; each of B_1, B_2, and B_3, independently, is -NH- or deleted; and each of D_1, D_2, and D_3, independently, is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, -C(O)-, $-SO_2-$, -CH(OR)-, -CH(COOR)-, 1,1-cyclopropylene, or deleted.

50. The composition of claim 49, wherein X is $-CH_2-$ or $-CH(CH_3)-$, Y is deleted, Z_1 is $-CH_2-$, and Z_2 is $-CH_2-$.

51. The composition of claim 49, wherein X is $-CH_2-$ or $-CH(CH_3)-$, Y is phenyl, Z_1 is $-CH_2-$ or $-SO_2-$, and Z_2 is $-CH_2-$ or $-SO_2-$.

52. The composition of claim 49, wherein X is $-CH_2-$, Y is 4,4'-biphenyl, Z_1 is $-CH_2-$, and Z_2 is $-CH_2-$.

53. The composition of claim 49, wherein X is $-CH_2-$, Y is phenyl, and R_3 is deleted.

54. The composition of claim 50, wherein R_3 is $-A_2-B_2-D_2-E_2$; R_4 is $-A_3-B_3-D_3-E_3$; A_1 is $-C_2H_4-$ or deleted; A_2 is deleted; A_3 is deleted; B_2 is deleted; B_3 is deleted; D_1 is $-CH_2-$; D_2 is deleted; D_3 is $-CH_2-$; E_1 is aryl or heteroaryl; E_2 is H; and E_3 is aryl or heteroaryl.

55. The composition of claim 51, wherein R_3 is $-A_2-B_2-D_2-E_2$ or, together with R_4, is C_4-C_{20} heterocycloalkyl or C_4-C_{20} heterocycloalkenyl; A_1 is $-C_2H_4-$ or $-CH(CH_3)CH_2-$; A_2 is $-C_2H_4-$ or deleted; A_3 is $-CH_2-$, $-C_2H_4-$, $-C_3H_6-$, $-CH(CH_2OH)-$, -CH(COOH)-, $-CH(CH_2OCH_3)-$, $-CH(CH_2CH_2OH)-$, $-CH(CH_2COOH)-$, or deleted; B_1 is -NH-, $-N(CH_2CH_2OH)-$, or $-N(CH_2CH_3)-$; D_1 is $-CH_2-$, $-CH(CH_3)-$, $-CH(CH_2OH)-$, $-CH(CH_2CH_2OH)-$, or deleted; D_2 is $-CH_2-$ or deleted; D_3 is $-CH_2-$, -CH(OH)-, -CH(COOH)-, 1,1-cyclopropylene, or deleted; E_1 is H, C_3-C_8 heterocycloalkyl, aryl, or

heteroaryl; E_2 is H, aryl, or heteroaryl; and E_3 is aryl, heteroaryl, C_3-C_8 cycloalkyl, C_5-C_8 cycloalkenyl, or C_3-C_8 heterocycloalkyl.

56. The composition of claim 52, wherein R_3 is -A_2-B_2-D_2-E_2; R_4 is -A_3-B_3-D_3-E_3; A_1 is -C_2H_4-; A_2 is deleted; A_3 is -$CH(CH_2OH)$-; B_1 is -NH-; B_2 is deleted; B_3 is deleted; D_1 is -CH_2-; D_2 is -CH_2- or deleted; D_3 is -CH_2-; E_1 is heteroaryl; E_2 is H or heteroaryl; and E_3 is aryl.

57. The composition of claim 53, wherein R_1 is heteroaryl; R_4 is -A_3-B_3-D_3-E_3; A_1 is -C_2H_4-; A_3 is deleted; B_1 is -NH-; B_3 is -NH-; D_1 is -CH_2-; D_3 is -C(O)-; E_1 is heteroaryl; and E_3 is heteroaryl.